

Geomorphological and Geological Characteristics of Large Catastrophic Ancient Landslides along Minjiang River in Diexi, Western Sichuan, China

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In the upstream of Minjiang River, Sichuan, China, there are many large landslides aligned along a 15-km section of the trunk river of Minjiang. The largest one is Diexi landslide. “Diexi landslide” induced by the 1933 earthquake was partial failure of this larger and older Diexi landslide. This large landslide was inferred to block the river and form a suite of lacustrine sediments with the thickness of over 200 m in this area. The trunk river of Minjiang has several knickpoints and the most outstanding one is located upstream of the Diexi and the nearby landslides. The long-river profile suggests that this knickpoint was formed not by landslides but by tectonic activity and that they propagated upstream. We made detailed geological field survey and topographic analysis to explore the history and mechanism of the ancient landslides including Diexi Landslide and its downstream Manaoding Landslide. Manaoding Landslide is of tightly folded alternating beds of sandstone and shale with fold axes plunging valleyward gently, which structure and joints with intersections nearly parallel to the fold axes were the basic structural cause of this landslide. Diexi Landslide is of mainly marble with two sets of joints; the joints and the bedding planes make intersections plunging gently valleyward, which destabilized the slopes in terms of wedge-failure. Long-term incision by the Minjiang River undercut slopes with the above structural defects and finally caused large landslides. This geological history could be typical examples of landslides affected by river-incision along Minjiang River and could provide a conceptual model of geohazard prediction and mitigation in the Minjiang drainage basin.

Keywords: Minjiang River, Landslide, Geologic structure, Geomorphology, River incision